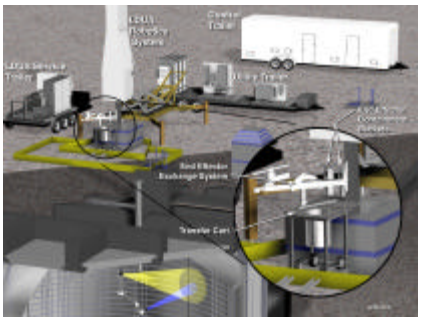
INEEL Light Duty Utility Arm Deployment

As part of a multiple DOE site development activity, the DOE Office of Science and Technology - Tank Focus Area funded the development of a robotic system to enter underground storage tanks. The INEEL was a key member in this team based upon it's need to perform activities in it's underground storage tank's and it's experience with the development of robotic systems for hazardous environments.

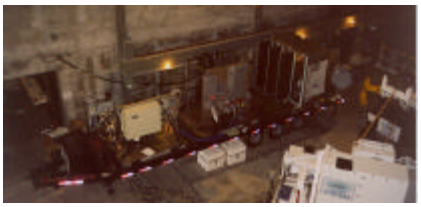
The robotic system was called the Light Duty Utility Arm, (LDUA). The DOE program supported the development of 4 robotic systems. Two truck mounted systems and two trailer mounded systems. Two systems presently reside at the INEEL, a trailer mounted system and a truck mounted system.

The INEEL trailer mounted LDUA system was received at the INEEL at the start of FY-98 and deployed in February 1999.



To support the deployment of the LDUA at the INEEL, the INEEL developed several systems.

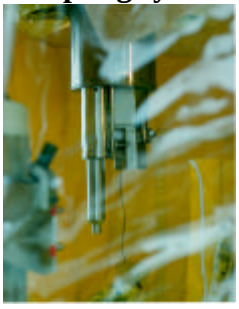
A **Utility Trailer,** consisting of a communication center called an At-Tank, a power distribution center and an air and water distribution center was developed.



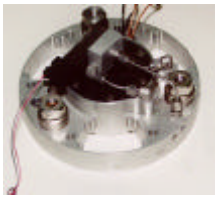
Three end effectors were deployed in the INEEL's first deployment of the LDUA. The end effectors were the **Video Camera system,**

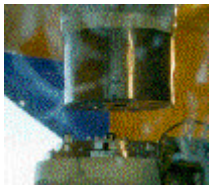
the **NDE system,**

developed by Oceaneering Space systems under DOE FETC funding, and the **Sampling system**.

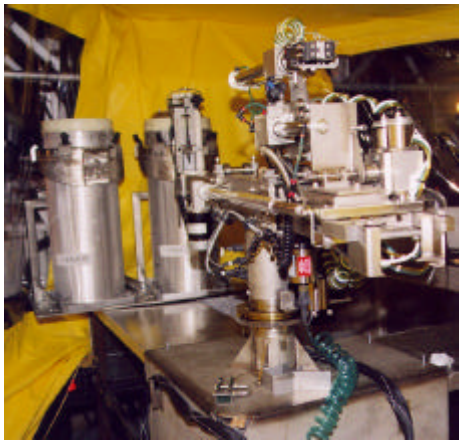


A remote latching system/tool plate was developed by the INEEL and incorporated into the LDUA system for the total remote handling of all the LDUA end effectors.





An **End Effector Exchange system** was developed to remotely position end effectors for remote attachment and unlatching of end effectors and to remove the sample chamber from the sampling end effector and place it in a shielded transport cart.



The deployment of the LDUA in the winter at Idaho was a significant change. Special care was taken to keep all the equipment heated while it was exposed the winter conditions and care was taken to slowly bring the equipment up to proper operating temperature before in tank operations began.

The INEEL LDUA deployment was a direct result of the teaming efforts of the DOE Office of Science and Technology - Tank Focus Area , INEEL Operations, INEEL Maintenance and the INEEL DOE office. Without the efforts of each one of these branches, the INEEL LDUA deployment could not have taken place.

The INEEL LDUA will continue it's mission at the INEEL by supporting the inspection, sampling, characterization and maintenance of tanks at the INEEL. It is anticipated that the LDUA system will be used to support activities in 1 to 3 tanks a year at the INEEL.

Future development activities for the INEEL LDUA system include the development of a gripper end effector and an Eddy-Current based NDE system for the detection of cracks, pits and wall thickness.

Additional activities are beginning investigated for the INEEL LDUA include support of closure activities for the INEEL tank farm; Support for the inspection and waste removal in the INEEL bin sets; Support for the inspection and information gathering on reactors.

Developers
-Idaho National Engineering and Environmental Laboratory
-Spar AeroSpace Limited
-Oceaneering Space Systems

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